

PATENT ABSTRACTS OF JAPAN

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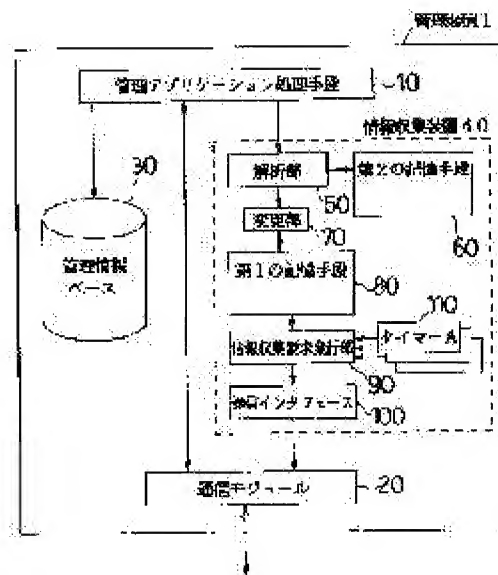
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(54) INFORMATION COLLECTION DEVICE

(57)Abstract:

PURPOSE: To allow a management equipment of a network management system to automatically update the setting of period when information is periodically collected from an equipment to be managed depending on the operating state of each managed equipment. CONSTITUTION: An analysis section 50 receives specific performance information included in collected management information from a management application processing means 10 and analyzes it and revises dynamically a communication equipment list based on the result of analysis. An information collection request publication section 90 references the communication equipment list to issue an acquisition request of management information at a timer period different from each equipment.



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2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] A management application process means to publish the overhead operation message transmitted and received to the various controlled units on a network, to analyze, and to process, It is prepared in the management equipment which has the communication module which transmits and receives the message with the controlled unit on a network. The timer which consists of a two or more timer component from which it is information gathering equipment for collecting management information oneself periodically, and a period differs, and outputs a time-out periodically, The 1st storage means which memorizes the communication equipment list in which correspondence with said time-out output and controlled unit is shown, and when said time-out is outputted, As opposed to the controlled unit corresponding to the time-out with reference to said 1st storage means The information gathering demand issue section which publishes the overhead operation message which requires acquisition of management information, The communication interface which performs communications processing to the overhead operation message which said information gathering demand issue section publishes, and is outputted to said communication module, The 2nd storage means which stores the list of timers according to the engine-performance information which expresses the situation of operation for every controlled unit, The analysis section which takes out the engine-performance information of the management information from the controlled unit which an application process means receives, and determines the suitable timer corresponding to said controlled unit with reference to said 2nd storage based on the engine-performance information, Information gathering equipment characterized by having the modification section which changes the contents of said 1st storage means into the timer which said analysis section determined when the timers corresponding to this controlled unit that the timer which said analysis section determined, and said 1st storage means memorize differ.

[Claim 2] Information gathering equipment according to claim 1 characterized by having formed two or more counters which carry out dividing of it to a timer component instead of said timer.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is prepared in network administration equipment, and relates to the information gathering equipment for collecting management information periodically from the various communication equipment which constitutes a network.

[0002]

[Description of the Prior Art] Establishment of the network administration technique for managing the information communication terminal on a network integrative in recent years is hurried. In order to realize especially network administration in a multi vendor environment, the attempt which is going to build a network management system based on OSI (open systems interconnection) which is international standards is made. For example, there are network administration products, such as Dual Manager (the U.S. network lab company make) and SunNetManager (Sun Microsystems, Inc. make), as conventional information gathering equipment.

[0003] Drawing 5 is the block diagram showing the configuration of the management equipment by the conventional technique, and the configuration of the information gathering equipment which is the part. 11 is management equipment. 12 is a management application process means, through a network, performs overhead operation to the communication equipment which is a controlled unit (outside of drawing), or receives the autonomous notice from a controlled unit.

[0004] 20 is a communication module and performs the communications processing for performing the data exchange with a controlled unit. 30 is a management information base and holds the management information about a controlled unit unitary. In this, the management information about a controlled unit collected by the overhead operation which minded the network from the management application process means 12 is stored. There is various information, such as engine-performance information, such as the number of transmitting packets and a receiving error rate, and the communication link condition of each controlled unit, and a communication link connection's identification information, in the management information managed by the management information base 30.

[0005] 41 is information gathering equipment and publishes the collection demand of management information to a controlled unit (outside of drawing). Information gathering equipment 41 consists of a component of 110, 80, and 90,100. 110 is a timer which consists of two or more timer components (timer components A, B, and C ...) from which a period differs.

[0006] 80 is 1st storage means which stores a communication equipment list. 90 which stores the list of controlled units corresponding to each timer component of a timer 110 in this communication equipment list is the information gathering demand issue section which emits the acquisition demand of management information, when a timer 110 outputs a time-out.

[0007] 100 is a communication interface which performs communications processing to the acquisition demand of management information, and is outputted to a communication module 20. The actuation is explained about the information gathering equipment 41 which is the management equipment 1 constituted as mentioned above and its part. In the case of two kinds of **, management equipment 11 emits the acquisition demand of management information, when there are directions from ** operations manager to a controlled unit (outside of drawing), or when being periodically performed by ** information gathering equipment 41.

[0008] That is, in **, the management application process means 12 publishes read-out directions of the management information according to the contents of directions to the direct communication module 20 with directions of an operations manager. ** a case -- a timer -- 110 - - containing -- having -- each -- a timer -- a component -- a time-out -- a trigger -- carrying out -- information gathering -- a demand -- issue -- the section -- 90 -- the -- one -- storage -- a means -- referring to -- a time-out -- having carried out -- a timer -- a component (for example, the timer component A) -- corresponding -- a controlled unit -- searching -- a timer -- a component -- A -- corresponding -- a controlled unit -- receiving -- read-out directions of management information

-- a communication interface 100 -- minding -- a communication-module 20 HE output -- carrying out .

[0009] A communication module 20 transmits the acquisition demand of the management information from ** management application process means 12 or ** information gathering equipment 41 to a controlled unit. On the other hand, a controlled unit (outside of drawing) returns the management information about a self-node to management equipment 11 in response to the information gathering demand from management equipment 11. The management information returned from the controlled unit is transmitted to the management application process means 12 through a communication module 20 in management equipment 11. The management application process means 12 analyzes the management information (current operational state of a controlled unit, engine performance, etc.), and stores the result in a management information base 30.

[0010] In addition, the value with which a network operations manager sets the period of the timer 110 whose management equipment 11 is the transmitting period of the acquisition demand of management information given to a controlled unit fixed as the 1st storage means 80 using the management application process means 12, or the value decided at the time of system install of a managerial system is used.

[0011]

[Problem(s) to be Solved by the Invention] However, with the conventional technique, the fixed value which the operations manager set up, or the fixed value set up at the time of system install had to be used for the period to which the information gathering equipment in management equipment emits the acquisition demand of management information, and publishing the acquisition demand of management information had the trouble were difficult, with the optimal period according to fluctuation of a situation [real time / network] of operation.

[0012] For example, if its attention is paid to the error rate which is one of the management information, it is necessary to gather information frequently and an error rate does not have to make it frequent to few controlled units conversely to the controlled unit which the error rate is increasing. Thus, the employment situation of a network or a controlled unit is changed, and gathering information with the fixed period had the trouble that it could not respond to such fluctuation, with the conventional technique rather than it is [nevertheless] appropriate.

[0013] This invention aims at offering the information gathering equipment which emits the acquisition demand of management information to the communication equipment which constitutes a network in consideration of fluctuation of a situation [real time / network] of operation.

[0014]

[Means for Solving the Problem] A management application process means for this invention to publish the overhead operation message transmitted and received to the various controlled units on a network, to analyze it, and to process in order to solve the above-mentioned technical problem, It is prepared in the management equipment which has the communication module which transmits and receives the message with the controlled unit on a network. The timer which outputs periodically two or more time-outs from which it is information gathering equipment for collecting management information oneself periodically, and a period differs, The 1st storage means which memorizes the communication equipment list in which correspondence with said time-out output and controlled unit is shown, and when said time-out is outputted, As opposed to the controlled unit corresponding to the time-out with reference to said 1st storage means The information gathering demand issue section which publishes the overhead operation message

which requires acquisition of management information, The communication interface which performs communications processing to the overhead operation message which said information gathering demand issue section publishes, and is outputted to said communication module, The 2nd storage means which stores the list of timers according to the engine-performance information which expresses the situation of operation for every controlled unit, The analysis section which takes out the engine-performance information of the management information from the controlled unit which an application process means receives, and determines the suitable timer corresponding to said controlled unit as the engine-performance information with reference to ***** from said 2nd storage, When the timers corresponding to this controlled unit that the timer which said analysis section determined, and said 1st storage means memorize differ, have up the modification section which changes the contents of said 1st storage means into the timer which said analysis section determined, and it is.

[0015]

[Function] The analysis section analyzes specific management information (for example, management information about the engine performance) among the management information collected from communication equipment (controlled unit), and determines the timer of a suitable period to the communication equipment by the configuration which described this invention above with reference to the 2nd storage means based on the result. The modification section is changed into the timer by which said analysis section determined the contents of said 1st storage means when the timers corresponding to this controlled unit that the timer which said analysis section determined, and said 1st storage means memorize differ. Thereby, since the contents of the communication equipment list storage means are updated serially, according to the situation of the network at that time of operation, the collection period of management information can be set as the optimal value.

[0016]

[Example] The 1st example of this invention is explained based on a drawing below. Drawing 2 is the schematic diagram of the network management system with which this invention is applied. 1 is management equipment which manages the whole network, and transmits the message for directing overhead operation to a controlled unit.

[0017] They are a controlled unit, and 2 and 3 carry out processing according to the overhead operation message which received from management equipment 1, and a response message is transmitted to management equipment 1, or they transmit the informative message for reporting the failure detected in each controlled unit 2 and the 3 interior to management equipment 1.

Drawing 3 shows the block diagram of the above-mentioned management equipment 1 and controlled units 2 and 3.

[0018] 10 and 2a are management application process means, respectively, through a network, perform overhead operation to the communication equipment which is a controlled unit, or receive the autonomous notice from a controlled unit. 20 and 2b are communication modules, respectively and perform communications protocol processing. That is, protocol processing made based on the OSI (Open Systems Interconnection) management command of ISO (International Organization for Standardization) specification to a controlled unit is performed. For example, REPORT command processing for reporting events, such as GET-command processing for directing read-out of the management information of a controlled unit 2, SET command processing which directs a setup of management information, and a failure generated with the controlled unit 2, to management equipment 1 etc. occurs.

[0019] 30 and 2c are management information bases, respectively. 40 is information gathering

equipment which publishes read-out directions of the management information of a controlled unit periodically. Drawing 1 is the block diagram having shown more the information gathering equipment 40 which is the part in the detail about the management equipment 1 of drawing 3. [0020] 50 is the analysis section, receives a part of engine-performance information included in the collected management information from the management application process means 10, and analyzes it. 60 is the 2nd storage means, and it connects with the analysis section 50 and it stores the list of the combination of the threshold of the multistage story to engine-performance information, and the timer value corresponding to those thresholds.

[0021] 70 is the modification section, and it connects with the analysis section 50 and it changes the contents of the 1st storage means 80. 110 is a timer and consists of two or more timer components (the timer component A, the timer component B, ..) from which a period differs. 90 which stores the list of controlled units corresponding to each timer component of a timer 110 in the 1st storage means 80 (communication equipment list) is the information gathering demand issue section, and when a timer 110 outputs a time-out, the acquisition demand of management information is published.

[0022] 100 is a communication interface, performs communications processing to the acquisition demand of management information, and outputs it to a communication module 20. The 1st storage means 80, information gathering demand issue section 90, timer 110, and communication interface 100 are the same as that of the conventional example of drawing 5. The actuation is explained about the 1st example constituted as mentioned above.

[0023] Management equipment 1 (drawing 3) requires acquisition of management information from a controlled unit 2, when there are directions from ** operations manager, or when being periodically carried out from ** information management equipment 40. It explains from the case of ** first on the facilities of explanation.

** When information gathering equipment 40 collects management information periodically, information gathering equipment 40 (drawing 1) outputs first the GET command which directs read-out of the management information of a controlled unit to a communication module 20, when the timer held inside becomes a time-out. That is, suppose that Timer A carried out the time-out among two or more timers 110 (Timer A, Timer B, ..) by which periods differ in drawing 1. The notice of a time-out is notified to the information gathering demand issue section 90 from Timer A. The information gathering demand issue section 90 makes it a trigger, creates the acquisition demand of the management information to the communication equipment which should collect management information with the period of Timer A with reference to the communication equipment list 80, and sends it to a communication module 20 through a communication interface 100.

[0024] Next, a communication module 20 (drawing 2) transmits the overhead operation message which shows a GET command to a controlled unit 2 according to the procedure which described this acquisition demand to the GET processing of the communications protocol processing libraries. On the other hand, in a controlled unit 2 (drawing 3), communication-module 2b performs reception of an overhead operation message, and restores the contents of the overhead operation which the message directs in management application process means 2a. Furthermore, management application process means 2a accesses management information base 2c according to the contents of directions, gains required management information, embeds it at a response message and returns it. This response message is outputted through communication-module 2b.

[0025] The response from a controlled unit 2 is sent to the management application process

means 10 through a communication module 20. Based on the acquired contents of a response, the management application process means 10 grasps engine performance, such as the employment condition and the number of receive packets of a controlled unit at that time, and an error rate, and sends a part of engine-performance information to the coincidence stored in a management information base 30 at the analysis section 50.

[0026] The analysis section 50 is referring to the 2nd storage means 60 based on the value of this engine-performance information, and determines a suitable timer. That is, since the timer classification (for example, if it is S1 and is the timer components A and S2 the timer component B ...) which should be used for it when exceeding the threshold (S1, S2 ...) of the multistage story to engine-performance information and its threshold for this 2nd storage means 60 is set up beforehand, according to the contents of the 2nd storage means 60, the timer classification corresponding to that engine-performance information which should be used is determined. When the timer component which the modification section 70 determined differs from the original timer component based on the decision, the controlled unit and the correspondence list of timer classification which are stored in the first storage means 80 are changed.

[0027] ** When based on directions from an operations manager, the GET demand according to the contents of directions is published from the management application process means 10 to the direct communication module 20. In a communication module 20, the overhead operation message which shows a GET command is transmitted to a controlled unit 2 according to the procedure described to the GET processing of the communications protocol processing libraries. This acquisition demand is transmitted to a controlled unit through a communication module 20. The actuation after this is the same as the case of **.

[0028] Since management equipment can update automatically the issue period of the management information collection demand to other communication equipment to the optimal value by analyzing specific management information according to this example, efficient management can be performed according to the condition of the controlled unit at that time. For example, the number of the management packets on a network can be stopped by failure detection early by choosing the timer of a shorter period becoming possible to the high controlled unit of possibility of an error rate increasing and causing a failure if an error rate is used as specific management information, and an error rate choosing the timer of a comparatively long period to a low controlled unit, and collecting management information.

[0029] The 2nd example of this invention is explained based on a drawing below. In addition, the network management system with which the 2nd example is applied is the same as that of drawing 2, and management equipment and the whole controlled unit configuration are the same as that of drawing 3. Drawing 4 shows the detailed configuration of the information gathering equipment in the 2nd example. However, the same number is given to the same component as the information gathering equipment of the 1st example shown in drawing 1, detailed explanation is omitted and only a different point is explained. information gathering equipment 40 -- setting -- 120 -- a timer -- it is -- 130-132 -- the period of a timer 120 -- positive-number twice (twice, 3 times, ..., n times) -- it is a counter for carrying out.

[0030] Actuation of the information gathering equipment 40 of the 2nd example constituted as mentioned above is explained using drawing 4. If a timer 120 carries out a time-out, the notice will be sent to both the information gathering demand issue section 90 and the counters 130-132. When counters 130-132 are counted up, respectively and each counter value which it has is reached, the notice of a time-out is sent to the information gathering issue section 90. The information gathering issue section 90 chooses the controlled unit to which starting of

information gathering should be applied with reference to the communication equipment list 80 by giving a trigger the received time-out notice, creates the acquisition demand of the management information to the controlled unit, and passes it to a communication interface 100. [0031] Thus, it is [that what is necessary is just to prepare one timer and two or more counters] effective in the ability to simplify mounting of information gathering equipment 40 by using the period of the timer used as the trigger of the information gathering demand issue section 90 as twice [positive-number] the timer 120.

[0032]

[Effect of the Invention] It is effective in becoming collectable [management information] the suitable period according to fluctuation of a situation [real time / controlled unit / each] of operation by changing the issue period of an acquisition demand of the management information to a controlled unit in information gathering equipment based on specific engine-performance information according to this invention, as explained above, and efficient management being attained. For example, the number of the management packets on a network can be stopped by failure detection early by choosing the timer of a shorter period becoming possible to the high controlled unit of possibility of an error rate increasing and causing a failure if an error rate is used as specific management information, and an error rate choosing the timer of a comparatively long period to a low controlled unit, and collecting management information.

TECHNICAL FIELD

[Industrial Application] This invention is prepared in network administration equipment, and relates to the information gathering equipment for collecting management information periodically from the various communication equipment which constitutes a network.

PRIOR ART

[Description of the Prior Art] Establishment of the network administration technique for managing the information communication terminal on a network integrative in recent years is hurried. In order to realize especially network administration in a multi vendor environment, the attempt which is going to build a network management system based on OSI (open systems interconnection) which is international standards is made. For example, there are network administration products, such as Dual Manager (the U.S. network lab company make) and SunNetManager (Sun Microsystems, Inc. make), as conventional information gathering equipment.

[0003] Drawing 5 is the block diagram showing the configuration of the management equipment by the conventional technique, and the configuration of the information gathering equipment which is the part. 11 is management equipment. 12 is a management application process means, through a network, performs overhead operation to the communication equipment which is a controlled unit (outside of drawing), or receives the autonomous notice from a controlled unit. [0004] 20 is a communication module and performs the communications processing for performing the data exchange with a controlled unit. 30 is a management information base and holds the management information about a controlled unit unitary. In this, the management

information about a controlled unit collected by the overhead operation which minded the network from the management application process means 12 is stored. There is various information, such as engine-performance information, such as the number of transmitting packets and a receiving error rate, and the communication link condition of each controlled unit, and a communication link connection's identification information, in the management information managed by the management information base 30.

[0005] 41 is information gathering equipment and publishes the collection demand of management information to a controlled unit (outside of drawing). Information gathering equipment 41 consists of a component of 110, 80, and 90,100. 110 is a timer which consists of two or more timer components (timer components A, B, and C ...) from which a period differs. [0006] 80 is 1st storage means which stores a communication equipment list. 90 which stores the list of controlled units corresponding to each timer component of a timer 110 in this communication equipment list is the information gathering demand issue section which emits the acquisition demand of management information, when a timer 110 outputs a time-out.

[0007] 100 is a communication interface which performs communications processing to the acquisition demand of management information, and is outputted to a communication module 20. The actuation is explained about the information gathering equipment 41 which is the management equipment 1 constituted as mentioned above and its part. In the case of two kinds of **, management equipment 11 emits the acquisition demand of management information, when there are directions from ** operations manager to a controlled unit (outside of drawing), or when being periodically performed by ** information gathering equipment 41.

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[0009] A communication module 20 transmits the acquisition demand of the management information from ** management application process means 12 or ** information gathering equipment 41 to a controlled unit. On the other hand, a controlled unit (outside of drawing) returns the management information about a self-node to management equipment 11 in response to the information gathering demand from management equipment 11. The management information returned from the controlled unit is transmitted to the management application process means 12 through a communication module 20 in management equipment 11. The management application process means 12 analyzes the management information (current operational state of a controlled unit, engine performance, etc.), and stores the result in a management information base 30.

[0010] In addition, the value with which a network operations manager sets the period of the timer 110 whose management equipment 11 is the transmitting period of the acquisition demand of management information given to a controlled unit fixed as the 1st storage means 80 using the management application process means 12, or the value decided at the time of system install of a managerial system is used.

EFFECT OF THE INVENTION

[Effect of the Invention] It is effective in becoming collectable [management information] the suitable period according to fluctuation of a situation [real time / controlled unit / each] of operation by changing the issue period of an acquisition demand of the management information to a controlled unit in information gathering equipment based on specific engine-performance information according to this invention, as explained above, and efficient management being attained. For example, the number of the management packets on a network can be stopped by failure detection early by choosing the timer of a shorter period becoming possible to the high controlled unit of possibility of an error rate increasing and causing a failure if an error rate is used as specific management information, and an error rate choosing the timer of a comparatively long period to a low controlled unit, and collecting management information.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, with the conventional technique, the fixed value which the operations manager set up, or the fixed value set up at the time of system install had to be used for the period to which the information gathering equipment in management equipment emits the acquisition demand of management information, and publishing the acquisition demand of management information had the trouble were difficult, with the optimal period according to fluctuation of a situation [real time / network] of operation.

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[0013] This invention aims at offering the information gathering equipment which emits the acquisition demand of management information to the communication equipment which constitutes a network in consideration of fluctuation of a situation [real time / network] of operation.

MEANS

[Means for Solving the Problem] A management application process means for this invention to publish the overhead operation message transmitted and received to the various controlled units on a network, to analyze it, and to process in order to solve the above-mentioned technical problem, It is prepared in the management equipment which has the communication module which transmits and receives the message with the controlled unit on a network. The timer which outputs periodically two or more time-outs from which it is information gathering equipment for collecting management information oneself periodically, and a period differs, The 1st storage

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OPERATION

[Function] The analysis section analyzes specific management information (for example, management information about the engine performance) among the management information collected from communication equipment (controlled unit), and determines the timer of a suitable period to the communication equipment by the configuration which described this invention above with reference to the 2nd storage means based on the result. The modification section is changed into the timer by which said analysis section determined the contents of said 1st storage means when the timers corresponding to this controlled unit that the timer which said analysis section determined, and said 1st storage means memorize differ. Thereby, since the contents of the communication equipment list storage means are updated serially, according to the situation of the network at that time of operation, the collection period of management information can be set as the optimal value.

EXAMPLE

[Example] The 1st example of this invention is explained based on a drawing below. Drawing 2 is the schematic diagram of the network management system with which this invention is applied. 1 is management equipment which manages the whole network, and transmits the message for directing overhead operation to a controlled unit.

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[0018] 10 and 2a are management application process means, respectively, through a network, perform overhead operation to the communication equipment which is a controlled unit, or receive the autonomous notice from a controlled unit. 20 and 2b are communication modules, respectively and perform communications protocol processing. That is, protocol processing made based on the OSI (Open Systems Interconnection) management command of ISO (International Organization for Standardization) specification to a controlled unit is performed. For example, REPORT command processing for reporting events, such as GET-command processing for directing read-out of the management information of a controlled unit 2, SET command processing which directs a setup of management information, and a failure generated with the controlled unit 2, to management equipment 1 etc. occurs.

[0019] 30 and 2c are management information bases, respectively. 40 is information gathering equipment which publishes read-out directions of the management information of a controlled unit periodically. Drawing 1 is the block diagram having shown more the information gathering equipment 40 which is the part in the detail about the management equipment 1 of drawing 3.

[0020] 50 is the analysis section, receives a part of engine-performance information included in the collected management information from the management application process means 10, and analyzes it. 60 is the 2nd storage means, and it connects with the analysis section 50 and it stores the list of the combination of the threshold of the multistage story to engine-performance information, and the timer value corresponding to those thresholds.

[0021] 70 is the modification section, and it connects with the analysis section 50 and it changes the contents of the 1st storage means 80. 110 is a timer and consists of two or more timer components (the timer component A, the timer component B, ..) from which a period differs. 90 which stores the list of controlled units corresponding to each timer component of a timer 110 in the 1st storage means 80 (communication equipment list) is the information gathering demand issue section, and when a timer 110 outputs a time-out, the acquisition demand of management information is published.

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** When information gathering equipment 40 collects management information periodically, information gathering equipment 40 (drawing 1) outputs first the GET command which directs read-out of the management information of a controlled unit to a communication module 20, when the timer held inside becomes a time-out. That is, suppose that Timer A carried out the time-out among two or more timers 110 (Timer A, Timer B, ..) by which periods differ in drawing 1. The notice of a time-out is notified to the information gathering demand issue section 90 from Timer A. The information gathering demand issue section 90 makes it a trigger, creates the acquisition demand of the management information to the communication equipment which should collect management information with the period of Timer A with reference to the communication equipment list 80, and sends it to a communication module 20 through a communication interface 100.

[0024] Next, a communication module 20 (drawing 2) transmits the overhead operation message which shows a GET command to a controlled unit 2 according to the procedure which described this acquisition demand to the GET processing of the communications protocol processing libraries. On the other hand, in a controlled unit 2 (drawing 3), communication-module 2b performs reception of an overhead operation message, and restores the contents of the overhead operation which the message directs in management application process means 2a. Furthermore, management application process means 2a accesses management information base 2c according to the contents of directions, gains required management information, embeds it at a response message and returns it. This response message is outputted through communication-module 2b.

[0025] The response from a controlled unit 2 is sent to the management application process means 10 through a communication module 20. Based on the acquired contents of a response, the management application process means 10 grasps engine performance, such as the employment condition and the number of receive packets of a controlled unit at that time, and an error rate, and sends a part of engine-performance information to the coincidence stored in a management information base 30 at the analysis section 50.

[0026] The analysis section 50 is referring to the 2nd storage means 60 based on the value of this engine-performance information, and determines a suitable timer. That is, since the timer classification (for example, if it is S1 and is the timer components A and S2 the timer component B ...) which should be used for it when exceeding the threshold (S1, S2 ...) of the multistage story to engine-performance information and its threshold for this 2nd storage means 60 is set up beforehand, according to the contents of the 2nd storage means 60, the timer classification corresponding to that engine-performance information which should be used is determined. When the timer component which the modification section 70 determined differs from the original timer component based on the decision, the controlled unit and the correspondence list of timer classification which are stored in the first storage means 80 are changed.

[0027] ** When based on directions from an operations manager, the GET demand according to the contents of directions is published from the management application process means 10 to the direct communication module 20. In a communication module 20, the overhead operation message which shows a GET command is transmitted to a controlled unit 2 according to the procedure described to the GET processing of the communications protocol processing libraries. This acquisition demand is transmitted to a controlled unit through a communication module 20. The actuation after this is the same as the case of **.

[0028] Since management equipment can update automatically the issue period of the management information collection demand to other communication equipment to the optimal value by analyzing specific management information according to this example, efficient management can be performed according to the condition of the controlled unit at that time. For example, the number of the management packets on a network can be stopped by failure detection early by choosing the timer of a shorter period becoming possible to the high controlled unit of possibility of an error rate increasing and causing a failure if an error rate is used as specific management information, and an error rate choosing the timer of a comparatively long period to a low controlled unit, and collecting management information.

[0029] The 2nd example of this invention is explained based on a drawing below. In addition, the network management system with which the 2nd example is applied is the same as that of drawing 2 , and management equipment and the whole controlled unit configuration are the same as that of drawing 3 . Drawing 4 shows the detailed configuration of the information gathering

equipment in the 2nd example. However, the same number is given to the same component as the information gathering equipment of the 1st example shown in drawing 1, detailed explanation is omitted and only a different point is explained. information gathering equipment 40 -- setting -- 120 -- a timer -- it is -- 130-132 -- the period of a timer 120 -- positive-number twice (twice, 3 times, ..., n times) -- it is a counter for carrying out.

[0030] Actuation of the information gathering equipment 40 of the 2nd example constituted as mentioned above is explained using drawing 4. If a timer 120 carries out a time-out, the notice will be sent to both the information gathering demand issue section 90 and the counters 130-132. When counters 130-132 are counted up, respectively and each counter value which it has is reached, the notice of a time-out is sent to the information gathering issue section 90. The information gathering issue section 90 chooses the controlled unit to which starting of information gathering should be applied with reference to the communication equipment list 80 by giving a trigger the received time-out notice, creates the acquisition demand of the management information to the controlled unit, and passes it to a communication interface 100. [0031] Thus, it is [that what is necessary is just to prepare one timer and two or more counters] effective in the ability to simplify mounting of information gathering equipment 40 by using the period of the timer used as the trigger of the information gathering demand issue section 90 as twice [positive-number] the timer 120.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing showing the configuration of the management equipment which has information gathering equipment in an example in the first place [of this invention]

[Drawing 2] Drawing showing the outline configuration of the network management system with which this invention is applied

[Drawing 3] Drawing showing the management equipment and the whole controlled unit configuration in the network management system with which this invention is applied

[Drawing 4] Drawing showing the configuration of management equipment with the information gathering equipment in the second example of this invention

[Drawing 5] Drawing showing the configuration of management equipment with conventional information gathering equipment

[Description of Notations]

1 Management Equipment

2 Controlled Unit

3 Controlled Unit

10 Management Application Process Means

20 Communication Module

30 Management Information Base

40 Information Gathering Equipment

50 Analysis Section

60 2nd Storage Means 70 Modification Section

80 1st Storage Means (Communication Equipment List)

90 Information Gathering Demand Issue Section

100 Communication Interface

110 Timer
130 Counter
131 Counter
132 Counter

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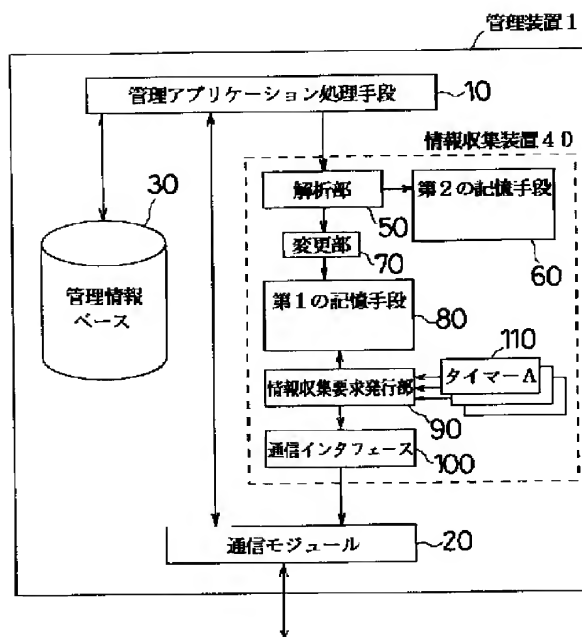
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(54) 【発明の名称】 情報収集装置

(57) 【要約】

【目的】 ネットワーク管理システムの管理装置が、被管理装置から周期的に情報を収集する場合の周期の設定を、個々の被管理装置の動作状況に応じて自動的に更新する。

【構成】 解析部は収集した管理情報に含まれる特定の性能情報を管理アプリケーション処理手段から受け取って解析し、その解析結果を基にして、通信機器リストを動的に変更する。情報収集要求発行部は、通信機器リストを参照して、機器ごとに異なるタイマー周期で、管理情報の獲得要求を発行する。



【特許請求の範囲】

【請求項1】 ネットワーク上の種々の被管理装置に対して送受信される管理操作メッセージを発行、解析、処理する管理アプリケーション処理手段と、そのメッセージをネットワーク上の被管理装置と送受信する通信モジュールを有する管理装置内に設けられ、管理情報を定期的に自ら収集するための情報収集装置であって、周期の異なる複数タイマー素子からなり、タイムアウトを定期的に出力するタイマーと、前記タイムアウト出力と被管理装置との対応を示す通信機器リストを記憶する第1の記憶手段と、前記タイムアウトが出力されたとき、前記第1の記憶手段を参照して、そのタイムアウトに対応する被管理装置に対して、管理情報の獲得を要求する管理操作メッセージを発行する情報収集要求発行部と、前記情報収集要求発行部が発行する管理操作メッセージに通信処理を施し、前記通信モジュールに出力する通信インタフェースと、被管理装置毎にその動作状況を表す性能情報に応じたタイマーのリストを格納する第2の記憶手段と、アプリケーション処理手段が受け取る被管理装置からの管理情報のうちの性能情報を取り出し、その性能情報に基づいて前記第2の記憶装置を参照し、前記被管理装置に対応する適切なタイマーを決定する解析部と、前記解析部が決定したタイマーと前記第1の記憶手段が記憶する該被管理装置に対応するタイマーが異なっている場合に、前記第1の記憶手段の内容を前記解析部が決定したタイマーに変更する変更部とを備えたことを特徴とする情報収集装置。

【請求項2】 前記タイマーの代わりに、タイマー素子と、それを分周する複数のカウンタを設けていることを特徴とする請求項1記載の情報収集装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、ネットワーク管理装置内に設けられ、ネットワークを構成する種々の通信機器から、定期的に管理情報を収集するための情報収集装置に関するものである。

【0002】

【従来の技術】近年、ネットワーク上の情報通信端末を統合的に管理するためのネットワーク管理技術の確立が急がれている。特にマルチベンダ環境でのネットワーク管理を実現するため、国際標準であるOSI（開放型システム間相互接続）に基づいてネットワーク管理システムを構築しようとする試みがなされている。例えば、従来の情報収集装置として、Dual Manager（米ネットラボ社製）やSunNet Manager（サンマイクロシステムズ社製）等のネットワーク管理製品がある。

【0003】図5は、従来技術による管理装置の構成、および、その一部である情報収集装置の構成を示すプロ

ック図である。11は、管理装置である。12は、管理アプリケーション処理手段であり、ネットワークを介して、被管理装置（図外）である通信機器に対する管理操作を行ったり、被管理装置からの自律的な通知を受け取ったりする。

【0004】20は、通信モジュールであり、被管理装置とのデータ交換を行うための通信処理を実行する。30は、管理情報ベースであり、被管理装置に関する管理情報を一元的に保持する。この中には管理アプリケーション処理手段12からネットワークを介した管理操作によって収集された、被管理装置に関する管理情報が格納される。管理情報ベース30によって管理される管理情報には、各被管理装置の送信パケット数や受信エラー率などの性能情報や、通信状態や通信コネクションの識別情報などの種々の情報がある。

【0005】41は、情報収集装置であり、被管理装置（図外）へ管理情報の収集要求を発行する。情報収集装置41は、110、80、90、100の構成要素からなる。110は、周期の異なる複数個のタイマー素子（タイマー素子A、B、C・・・）からなるタイマーである。

【0006】80は、通信機器リストを格納する第1の記憶手段である。この通信機器リストはタイマー110の個々のタイマー素子に対応する被管理装置のリストを格納する90は、タイマー110がタイムアウトを出力したとき、管理情報の獲得要求を発する情報収集要求発行部である。

【0007】100は、管理情報の獲得要求に通信処理を施し、通信モジュール20に出力する通信インタフェースである。以上のように構成された管理装置1及びその一部である情報収集装置41について、その動作を説明する。管理装置11は、被管理装置（図外）に対して、①運用管理者から指示があった場合、または②情報収集装置41により定期的に行われる場合、の2通りの場合に、管理情報の獲得要求を発する。

【0008】すなわち、①の場合、運用管理者の指示により管理アプリケーション処理手段12は、直接通信モジュール20に対して指示内容に応じた管理情報の読み出し指示を発行する。②の場合、タイマー110に含まれる個々のタイマー素子のタイムアウトをトリガーにして、情報収集要求発行部90は、第1の記憶手段を参照して、タイムアウトしたタイマー素子（例えばタイマー素子A）に対応する被管理装置を検索し、タイマー素子Aに対応する被管理装置に対して、管理情報の読み出し指示を通信インタフェース100を介して、通信モジュール20へ出力する。

【0009】通信モジュール20は、①管理アプリケーション処理手段12、または②情報収集装置41からの管理情報の獲得要求を被管理装置に送信する。一方、被管理装置（図外）は、管理装置11からの情報収集要求

に応じて、自ノードに関する管理情報を管理装置11に対して返送する。被管理装置から返送された管理情報は、管理装置11において、通信モジュール20を介して管理アプリケーション処理手段12に伝達される。管理アプリケーション処理手段12は、その管理情報（被管理装置の現在の運用状態、性能等）を解析し、その結果を管理情報ベース30に格納する。

【0010】なお、管理装置11が被管理装置に対して行なう管理情報の獲得要求の送信周期であるタイマー110の周期は、ネットワークの運用管理者が、管理アプリケーション処理手段12を用いて、第1の記憶手段80に固定的に設定する値、または、管理システムのシステムインストール時に決められた値が用いられる。

【0011】

【発明が解決しようとする課題】しかしながら、従来技術では、管理装置における情報収集装置が管理情報の獲得要求を発する周期は、運用管理者が設定した固定値、または、システムインストール時に設定した固定値を用いなければならない、ネットワークのリアルタイムな動作状況の変動に応じた最適な周期によって、管理情報の獲得要求を発行することは困難であるという問題点を有していた。

【0012】たとえば、管理情報の1つであるエラー率に着目すると、エラー率が増加している被管理装置に対しては、頻繁に情報収集する必要がある、逆に、エラー率が少ない被管理装置に対しては、頻繁にする必要がない。このように、ネットワークや被管理装置の運用状況は変動していくものであって、固定した周期で情報収集することは適切ではない、にもかかわらず従来技術では、このような変動に対応できないという問題点があった。

【0013】本発明は、ネットワークのリアルタイムな動作状況の変動を考慮して、ネットワークを構成する通信機器に対して管理情報の獲得要求を発する情報収集装置を提供することを目的とする。

【0014】

【課題を解決するための手段】 上記課題を解決するために本発明は、ネットワーク上の種々の被管理装置に対して送受信される管理操作メッセージを発行、解析、処理する管理アプリケーション処理手段と、そのメッセージをネットワーク上の被管理装置と送受信する通信モジュールを有する管理装置内に設けられ、管理情報を定期的に自ら収集するための情報収集装置であって、周期の異なる複数のタイムアウトを定期的に出力するタイマーと、前記タイムアウト出力と被管理装置との対応を示す通信機器リストを記憶する第1の記憶手段と、前記タイムアウトが出力されたとき、前記第1の記憶手段を参照して、そのタイムアウトに対応する被管理装置に対して、管理情報の獲得を要求する管理操作メッセージを発行する情報収集要求発行部と、前記情報収集要求発行部

が発行する管理操作メッセージに通信処理を施し、前記通信モジュールに出力する通信インタフェースと、被管理装置毎にその動作状況を表す性能情報に応じたタイマーのリストを格納する第2の記憶手段と、アプリケーション処理手段が受け取る被管理装置からの管理情報のうちの性能情報を取り出し、その性能情報に基づいて前記第2の記憶装置から参照し、前記被管理装置に対応する適切なタイマーを決定する解析部と、前記解析部が決定したタイマーと前記第1の記憶手段が記憶する該被管理装置に対応するタイマーが異なっている場合に、前記第1の記憶手段の内容を前記解析部が決定したタイマーに変更する変更部とを備えたている。

【0015】

【作用】本発明は上記した構成によって、解析部は、通信機器（被管理装置）から収集した管理情報の内、特定の管理情報（例えば、性能に関する管理情報）を解析し、その結果を基にして、第2の記憶手段を参照してその通信機器に対して適切な周期のタイマーを決定する。変更部は、前記解析部が決定したタイマーと前記第1の記憶手段が記憶する該被管理装置に対応するタイマーが異なっている場合に、前記第1の記憶手段の内容を前記解析部が決定したタイマーに変更する。これにより、逐次通信機器リスト記憶手段の内容が更新されるので、その時のネットワークの動作状況に応じて管理情報の収集周期を最適な値に設定することができる。

【0016】

【実施例】以下本発明の第1の実施例を図面に基いて説明する。図2は、本発明の適用されるネットワーク管理システムの概略図である。1は、ネットワーク全体を管理する管理装置であり、被管理装置に対して管理操作を指示するためのメッセージを送信する。

【0017】2、3は、被管理装置であり、管理装置1から受信した管理操作メッセージに応じた処理を実施し、管理装置1に回答メッセージを送信したり、各被管理装置2、3内部で検出した障害を報告するための通知メッセージを管理装置1に送信する。図3は、上記管理装置1、及び被管理装置2、3のブロック図を示す。

【0018】10、2aは、それぞれ管理アプリケーション処理手段であり、ネットワークを介して、被管理装置である通信機器に対する管理操作を行ったり、被管理装置からの自律的な通知を受け取ったりする。20、2bは、それぞれ通信モジュールであり、通信プロトコル処理を行なう。すなわち、被管理装置に対してISO (International Organization for Standardization)規格のOSI (Open Systems Interconnection)管理コマンドに準拠させるプロトコル処理を施す。たとえば、被管理装置2の管理情報の読出しを指示するためのGETコマンド処理、管理情報の設定を指示するSETコマンド処理、被管理装置2で発生した障害等のイベントを管理装置1に報告するためのREPORTコマンド処理等が

ある。

【0019】30, 2cは、それぞれ管理情報ベースである。40は、定期的に被管理装置の管理情報の読出し指示を発行する情報収集装置である。図1は、図3の管理装置1について、その一部である情報収集装置40をより詳細に示したブロック図である。

【0020】50は、解析部であり、収集した管理情報に含まれる一部の性能情報を管理アプリケーション処理手段10から受取って解析する。60は、第2の記憶手段であり、解析部50に接続されて、性能情報に対する多段階のしきい値とそれらのしきい値に対応するタイマー値との組み合わせのリストを格納する。

【0021】70は、変更部であり、解析部50に接続されて、第1の記憶手段80の内容を変更する。110は、タイマーであり、周期の異なる複数のタイマー素子（タイマー素子A、タイマー素子B、・・・）からなる。第1の記憶手段80は、タイマー110の個々のタイマー素子に対応する被管理装置のリスト（通信機器リスト）を格納する。90は、情報収集要求発行部であり、タイマー110がタイムアウトを出力したとき、管理情報の獲得要求を発行する。

【0022】100は、通信インタフェースであり、管理情報の獲得要求に通信処理を施し、通信モジュール20に出力する。第1の記憶手段80、情報収集要求発行部90、タイマー110及び通信インタフェース100は、図5の従来例と同様である。以上のように構成された第1の実施例について、その動作を説明する。

【0023】管理装置1（図3）は、①運用管理者からの指示があった場合、または②情報管理装置40から定期的に行われる場合、被管理装置2に対して管理情報の獲得を要求する。説明の便宜上まず②の場合から説明する。

②情報収集装置40が定期的に管理情報を収集する場合、まず、情報収集装置40（図1）は、内部に保有するタイマーがタイムアウトになったとき、通信モジュール20に被管理装置の管理情報の読み出しを指示するGETコマンドを出力する。すなわち、図1において周期の異なる複数のタイマー110（タイマーA、タイマーB、・・・）の内、タイマーAがタイムアウトしたとする。タイムアウト通知はタイマーAから情報収集要求発行部90に通知される。情報収集要求発行部90は、それをトリガにして、通信機器リスト80を参照し、タイマーAの周期で管理情報を収集すべき通信機器に対する管理情報の獲得要求を作成し、通信インタフェース100を介して通信モジュール20に送る。

【0024】次に、通信モジュール20（図2）は、この獲得要求を、通信プロトコル処理ライブラリ内のGET処理に記述した手順にしたがって、GETコマンドを示す管理操作メッセージを被管理装置2に送信する。一方、被管理装置2（図3）では、通信モジュール2b

が管理操作メッセージの受信処理を行い、そのメッセージが指示する管理操作の内容を管理アプリケーション処理手段2aにおいて復元する。さらに、管理アプリケーション処理手段2aは、その指示内容にしたがって管理情報ベース2cをアクセスして必要な管理情報を獲得し、それを応答メッセージに埋め込んで返送する。この応答メッセージは通信モジュール2bを介して出力される。

【0025】被管理装置2からの応答は、通信モジュール20を介して管理アプリケーション処理手段10に送られる。管理アプリケーション処理手段10は、獲得した応答内容を基に、その時の被管理装置の運用状態および受信パケット数やエラー率等の性能を把握し、管理情報ベース30に格納する、同時に、一部の性能情報を解析部50に送る。

【0026】解析部50は、この性能情報の値を基に第2の記憶手段60を参照することで、適切なタイマーを決定する。すなわち、この第2の記憶手段60には、性能情報に対する多段階のしきい値（S1, S2・・・）、及びそのしきい値を超える場合に使用すべきタイマー種別（例えばS1ならタイマー素子A, S2ならタイマー素子B・・・）が予め設定されているので、第2の記憶手段60の内容に従って、その性能情報に対応する使用すべきタイマー種別が決定される。その決定に基づいて変更部70は、決定したタイマー素子が元のタイマー素子と異なる場合には、第1の記憶手段80に格納されている被管理装置とタイマー種別の対応リストを変更する。

【0027】①運用管理者からの指示による場合
管理アプリケーション処理手段10から直接通信モジュール20に対して指示内容に応じたGET要求が発行される。通信モジュール20では通信プロトコル処理ライブラリ内のGET処理に記述した手順にしたがって、GETコマンドを示す管理操作メッセージを被管理装置2に送信する。この獲得要求は通信モジュール20を経て、被管理装置に対し送信される。これ以降の動作は②の場合と同じである。

【0028】本実施例によれば、管理装置は他の通信機器に対する管理情報収集要求の発行周期を、特定の管理情報を解析することによって、最適な値に自動的に更新できるので、その時の被管理装置の状態に応じて、効率の良い管理を行うことができる。たとえば、特定の管理情報としてエラー率を使用すると、エラー率が増加して障害を起こす可能性の高い被管理装置に対しては、より短い周期のタイマーを選択することで早期の障害検出が可能となり、またエラー率が低い被管理装置に対しては、比較的長い周期のタイマーを選択して管理情報を収集することで、ネットワーク上の管理パケットの数を抑えることができる。

【0029】以下本発明の第2の実施例について図面に

基づいて説明する。なお、第2の実施例が適用されるネットワーク管理システムは図2と同様であり、管理装置及び被管理装置の全体構成は図3と同様である。図4は第2の実施例における情報収集装置の詳細な構成を示している。ただし、図1に示した第1の実施例の情報収集装置と同じ構成要素には同一番号を付し、詳細な説明は省略し、異なる点のみ説明する。情報収集装置40において、120はタイマーであり、130～132はタイマー120の周期を正数倍（2倍、3倍、・・・、n倍）するためのカウンタである。

【0030】以上のように構成された第2の実施例の情報収集装置40の動作について、図4を用いて説明する。タイマー120がタイムアウトすると、その通知は情報収集要求発行部90とカウンタ130～132との両方に送られる。カウンタ130～132はそれぞれカウントアップし、それぞれの持つカウンタ値に達した時に、情報収集発行部90に対してタイムアウト通知を送る。情報収集発行部90は、受け取ったタイムアウト通知をトリガとして、通信機器リスト80を参照して、情報収集の起動をかけるべき被管理装置を選択し、その被管理装置に対する管理情報の獲得要求を作成して通信インタフェース100に渡す。

【0031】このように、情報収集要求発行部90のトリガとなるタイマーの周期を、タイマー120の正数倍とすることにより、1つのタイマーと複数個のカウンタを準備するだけでよく、情報収集装置40の実装を簡略化することができるという効果がある。

【0032】

【発明の効果】以上説明してきたように本発明によれば、特定の性能情報を基に、情報収集装置において、被管理装置に対する管理情報の獲得要求の発行周期を変更することにより、それぞれの被管理装置のリアルタイムな動作状況の変動に応じた適切な周期で管理情報の収集が可能となり、効率の良い管理が可能になるという効果がある。たとえば、特定の管理情報としてエラー率を使

用すると、エラー率が増加して障害を起こす可能性の高い被管理装置に対しては、より短い周期のタイマーを選択することで早期の障害検出が可能となり、またエラー率が低い被管理装置に対しては、比較的長い周期のタイマーを選択して管理情報を収集することで、ネットワーク上の管理パケットの数を抑えることができる。

【図面の簡単な説明】

【図1】本発明の第一に実施例における情報収集装置を持つ管理装置の構成を示す図

10 【図2】本発明が適用されるネットワーク管理システムの概略構成を示す図

【図3】本発明が適用されるネットワーク管理システムにおける管理装置と被管理装置の全体構成を示す図

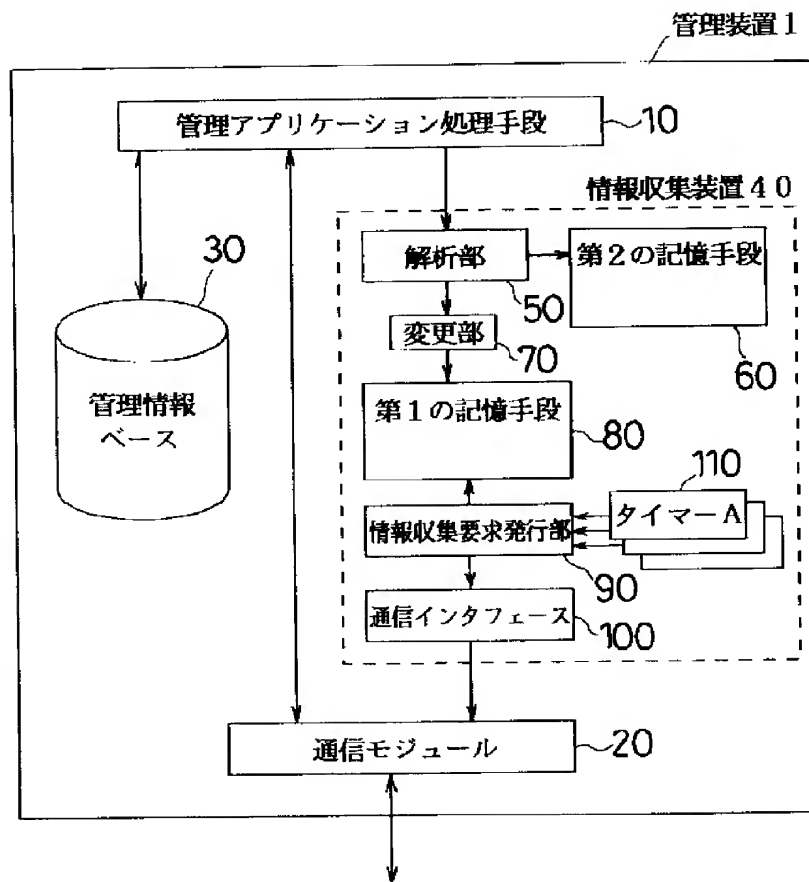
【図4】本発明の第二の実施例における情報収集装置を持つ管理装置の構成を示す図

【図5】従来の情報収集装置を持つ管理装置の構成を示す図

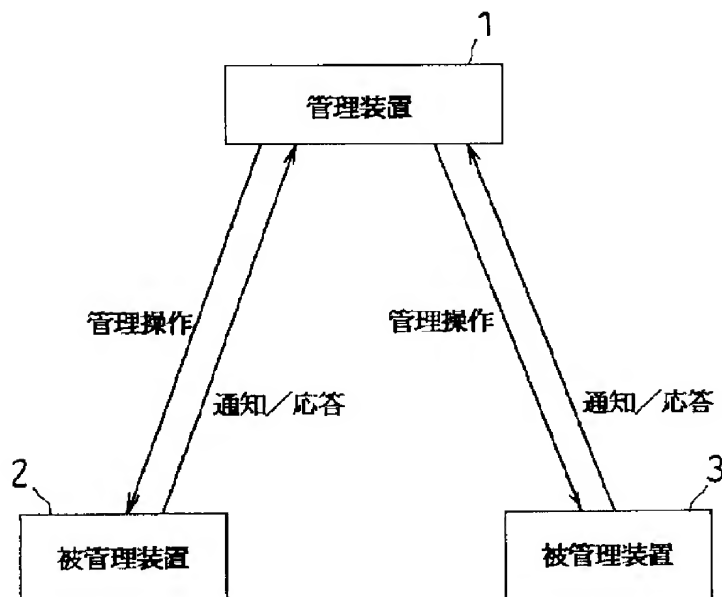
【符号の説明】

- 1 管理装置
- 2 被管理装置
- 3 被管理装置
- 10 管理アプリケーション処理手段
- 20 通信モジュール
- 30 管理情報ベース
- 40 情報収集装置
- 50 解析部
- 60 第2の記憶手段70 変更部
- 80 第1の記憶手段（通信機器リスト）
- 90 情報収集要求発行部
- 100 通信インタフェース
- 110 タイマー
- 130 カウンタ
- 131 カウンタ
- 132 カウンタ

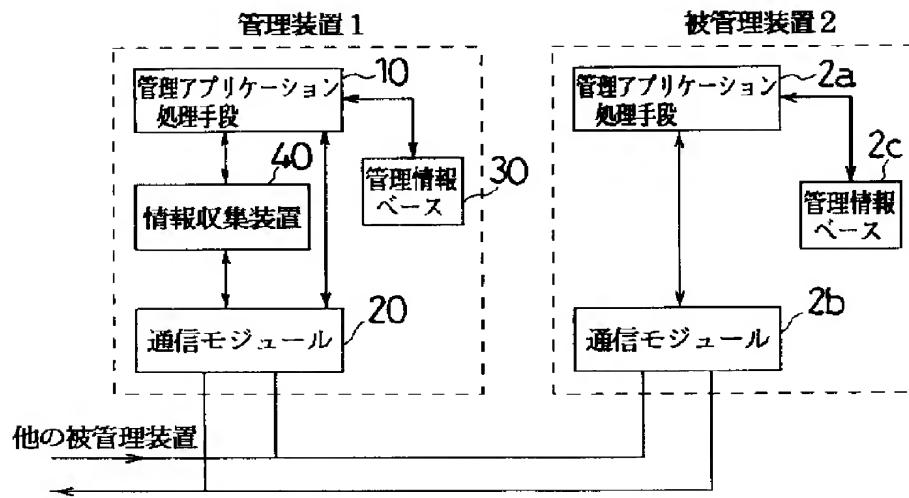
【図1】



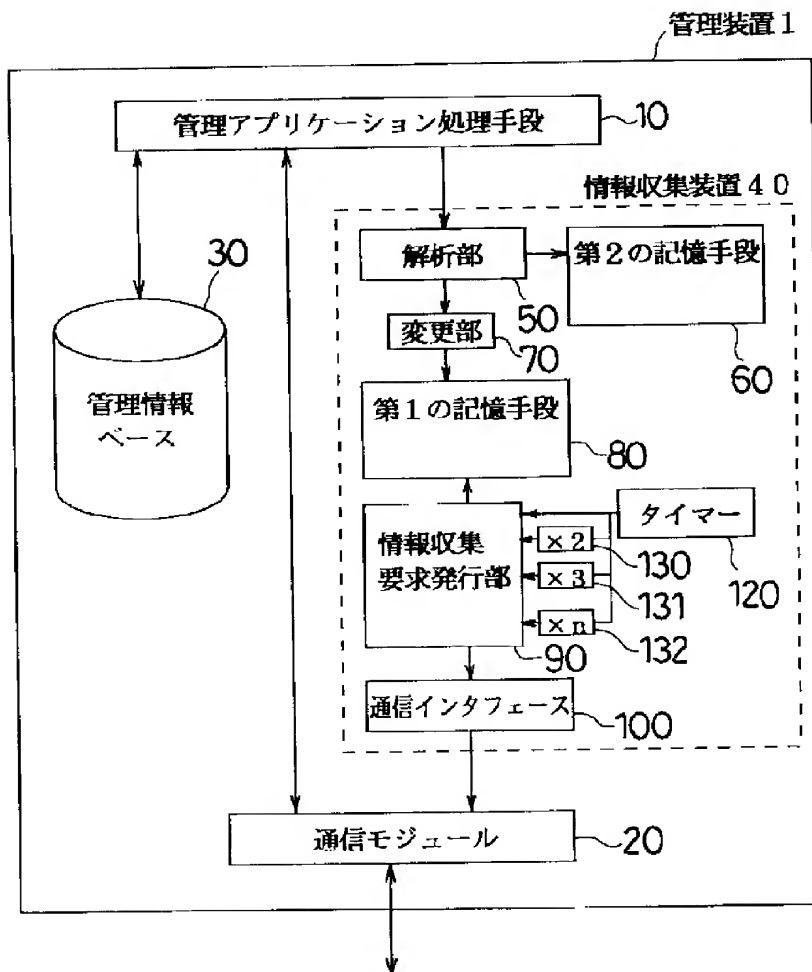
【図2】



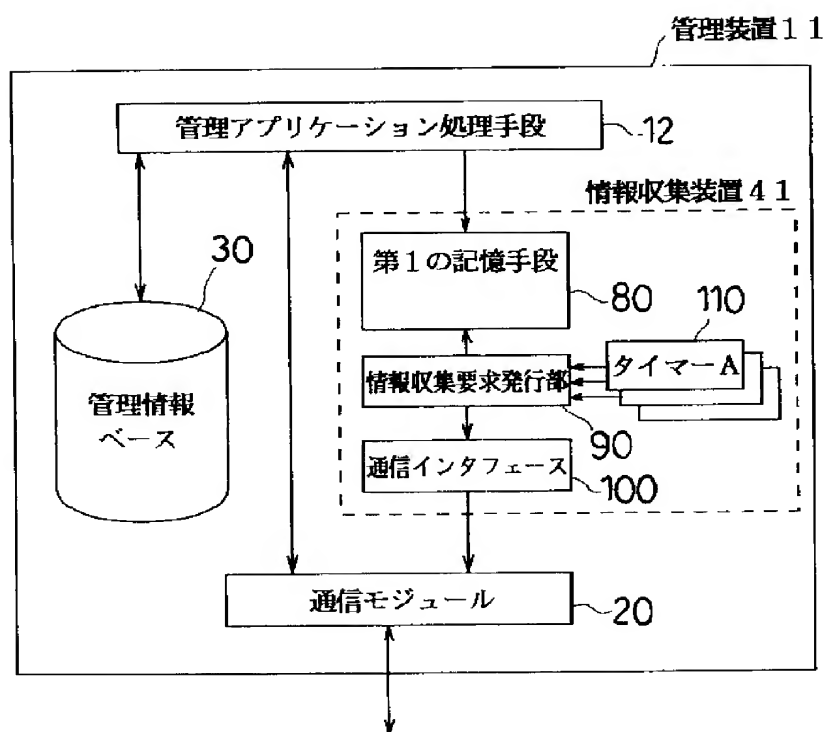
【図3】



【図4】



【図5】



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